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OBTAINING IMAGES BY ELECTROGRAPHIC MEANS

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At present, we have the following well-known technical methods for obtaining images: (1) ordinary black and white photography and light photography, in which the energy of the incident light or of the flow of corpuscular particles is utilized to obtain at first latent and later developed images in the photographic emulsion layer; (2) typographical printing; (3) television; and (4) electrostatic photography.

The latter method involves the following: light acts upon a layer of a photosemiconductor which (the layer) has previously been charged to a certain potential, the semiconductor having been laid upon a metal base. In this situation a latent image is obtained in consequence of the charge running off from the illuminated areas and the charge remaining or being diminished correspondingly in the unexposed or weakly lighted areas. Development is effected by sprinkling a fine-grained powder made of any dielectric.

By electrographical means one can obtain images of raised metal objects without employing a light source or photographic film. The essence of this method is as follows: the metal object whose image we desire to obtain is laid on a plate made of a good dielectric with a smooth surface and charged to high potential (from about 5,000 volts and above). It is necessary that the object have as many points as possible in contact with the insulating base.

After the charging, the metal object is grounded with the aid of any discharger and then removed from the surface of the dielectric. On the surface of the dielectric, in the place where the metal object was located, a latent electrostatic image is formed.

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This latent image becomes visible after a finely dispersed powder is sprinkled on the dielectric (for example, lycopodium or rosin). The excess of powder is shaken off, and on the plate remains the so-called developed powdery image.

Spivak and his co-workers have obtained images in a corona discharge. In their first experiments they obtained the image of the surface of a metal object inserted in a corona discharge on a photographic plate (see G. Spivak and O. Kardash, Sowj Physik, Vol X, 1946, p 252. In the second case they obtained a deformed image of the surface of an object (zinc plate) on ebonite when the object was illuminated with an intense beam of x-rays or short ultraviolet rays (see G. Spivak and Lukatskaya, Trudy Mosk Gos Univ, No 4, 1949).

The photoelectrons ejected out of the surface of the object fell on ebonite and electrified the area of incidence. An image appeared after the ebonite plate was sprinkled with a powder.

Thus, in both cases ordinary photographic material or radiant energy were utilized. In the method described by us the image is obtained in the absence of a light source and ordinary photographic material, namely, silver bromide emulsion layer.

To obtain an electrographic image it is necessary to impart a high electrical potential to a metal object. This potential is imparted to the object either directly with the electrode of a high-voltage generator or in the field of a corona discharge from one of the electrodes of the generator.

A latent electrographic image is obtained in consequence of the inhomogenicity of the field under the surface of the metal object, if the object is raised, or just the outline of the object, when the electrographicized surface is smooth.

The powdery image obtained, if not affected directly by physical means, is preserved for several months depending upon conditions of maintenance, without deterioration. An important role here is played by moisture.

The plate with the image can be subjected to rather sharp shocks, even blows, without affecting the quality of the image.

The image obtained can be "fixed." To do this the latent electrographic image must be developed by rosin or other easily melted powder. Light heating melts the powder and thus permanently fixes the image.

Not on all dielectrics can one obtain latent electrographic images. Glass, for example, will not work because of the relatively high surface conductivity. Images of poor quality were obtained on ebonite.

The best results were obtained on plexiglas and sulfur. The powder used was crushed rosin and lycopodium. (For technical reasons -- namely the insufficient contrast between the under base and the powder image -- no photographs are shown in this article.)

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